

means of separating from each other the young individuals of the two species, and agree with one of the best distinctive characters of the adults. The very small examples of both species not only have the præoperculum furnished with spines, but they have also a scapular spine and a postsupraorbital spine on each side. The larger specimens have a rather elongate form, but are at the same time pretty thick, and not compressed as at a later period; the dorsal, which is comparatively rather low, originates, in the adult *C. equisetis*, at a point not far distant from the posterior margin of the eye, in young individuals above the posterior margin of the præoperculum, in still younger individuals between the latter and the gill-cleft, in the adult *C. hippurus* above the posterior margin of the pupil, in the youngest individuals above the gill-cleft, &c. The system of coloration which distinguishes the different ages of these two species will be easily understood by the aid of the figures.

[To be continued.]

II.—*On some new or imperfectly-known Species of Corals from the Devonian Rocks of France.* By H. ALLEYNE NICHOLSON, M.D., D.Sc., F.R.S.E.

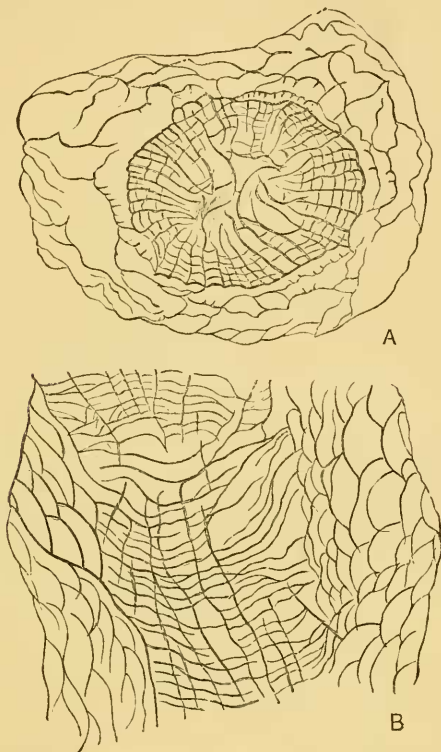
[Plate I.]

SOME little time ago M. Daniel Œhlert, the able Curator of the Museum of Natural History in Laval, was good enough to send me for examination and determination a number of corals from the inferior Devonian deposits of the neighbourhood of Laval, the stratigraphical and palæontological relations of these deposits having been made by him a subject of special study. Among the specimens contained in the collection submitted to me were some entirely new forms, as well as some which have not yet been fully worked out; and I propose on the present occasion, in accordance with M. Œhlert's wish, to give a brief description of the more important and striking of these.

Endophyllum Œhlerti, Nich.

Spec. char. Corallum composed of subcylindrical corallites, which are either not in contact at all or, at most, touch each other only at limited portions of their circumference. The diameter of the corallites along their longest axis is from 20 to 25 millims. Each corallite is enveloped in a distinct

epitheca, which, though not thick, is provided with irregular, somewhat sharp-edged, closely-set annulations, and is marked with faint longitudinal or costal ridges. The exterior zone of the corallum for a width of from 3 to 4 millims. is made up



Thin sections of *Endophyllum Ehleri*, Nich., enlarged rather more than twice. A. Transverse section of a corallite, showing the outer vesicular zone and the inner tabulate area, the latter intersected by the septa. B. Vertical section of the same, showing the same two areas: the bending upwards of the tabulae in the outer part of the inner area is here well shown, and the cut edges of a number of the septa, in the form of longitudinal lines, are also exhibited, owing to the fact that the section is slightly excentric; on the left-hand corner of the figure a part of the exterior vesicular zone has been restored.

of large-sized, irregularly-shaped lenticular vesicles, which in vertical sections (fig. B) are seen to be directed with their longest axes passing obliquely downwards from the circumference towards the internal wall. Their greatest length varies from 1 to 5 or 6 millims. The inner mural investment is well marked, and encloses a space of from 14 to 15

millims. in its greatest length, which is subdivided by a series of well-developed septa. The septa are alternately long and short, about thirty-six of each series existing in a corallite of 25 millims. width, flexuous, the longer ones extending to near the centre of the visceral chamber. Traces of vertical lamellæ also exist in the exterior vesicular zone, these representing the imperfect outward prolongation of the septa from the inner area. Dissepiments (which are really only the cut edges of the ascending tabulæ) are developed in the outer portion of the central tabulate area. The tabulæ are well developed in the central portion of the corallites, where bounded by the inner mural circle, being close-set and nearly horizontal in the middle of this region, but becoming sharply bent up towards its margins.

Obs. I have founded this species upon a single well-preserved specimen in the possession of M. Ehlert.

The specimen in question exhibits four corallites, of which two are quite separate from the others, standing at a distance respectively of 2 and 11 millims. apart from them, while the remaining two are in contact for a distance of nearly 2 centims., the one being indented by the pressure of its neighbour. Even in this case, however, the contiguity is not attended by any real union or amalgamation, the two corallites being each provided with its own distinct epitheca, and being quite readily separable from one another. The basal portions of the corallites are enveloped in the matrix; and their precise mode of origin is therefore uncertain.

As regards the internal structure, the points most worthy of notice will be readily recognized by reference to the preceding description and by the accompanying drawings of the transverse and vertical sections of one of the corallites (figs. A and B).

There can be no doubt that the present species is a true *Endophyllum*, in spite of the fact that the corallites possess a distinct epithecal investment, and that this structure is stated by Milne-Edwards and Haime to be wanting in this genus. In all the points of its internal structure, however, it entirely agrees with the other recorded species of the genus; and the development of the epitheca must therefore be taken to be a variable character. In point of fact *E. abditum*, E. & H., does possess well-developed walls to the corallites, and the absence of an epitheca is probably only due to the coalescent condition of the corallites.

From *E. abditum*, E. & H., the present species is at once distinguished by the disjunct condition of the corallites and their much smaller size.

From *E. Bowerbanki*, E. & H., the present species is separated by the fact that each of the corallites possesses a well-developed external investment, while the corallum is not astræiform.

Horizon and Locality. Inferior Devonian, Montjean, Gallois (coll. *Æhlert*).

Striatopora pachystoma, Nich.
(Pl. I. figs. 1-1 b.)

Spec. char. Corallum ramose, composed of cylindrical or subcylindrical branches, which have a diameter of from 5 to 10 millims. The corallites are primitively polygonal, with exceedingly distinct walls, but having the visceral chambers greatly contracted by a secondary deposit of light-coloured sclerenchyma deposited in concentric lamellæ, the amount of this thickening being greatly increased as the mouths of the tubes are approached (Pl. I. fig. 1 a). The size of the corallites is very variable, the largest ones having a long diameter of about 3 millims. (from wall to wall), while the smallest ones may not be much over a millimetre in width when similarly measured. The preservation of the calices in all specimens I have seen is poor; but they are not surrounded by thin and sharp margins, and tangential sections show that the diameter of the visceral chambers near their mouths varies from a millimetre and a half in the largest tubes to about half a millimetre in the smallest corallites. No septal teeth, or but very rudimentary ridges, are developed on the neck of the tubes. No traces of tabulæ are recognizable in long sections (Pl. I. fig. 1 b), but the walls of the tubes are seen to be perforated by a few remote and irregularly-distributed mural pores.

Obs. This species is most nearly allied to the *Striatopora Linneana*, Billings, of the Devonian rocks of Canada (see Nicholson, Tabulate Cor. of the Pal. Period, p. 100, pl. v. figs. 2-2 d), which it much resembles in its general aspect. It is, however, in general a coarser and more stoutly-built form, and it differs structurally from *S. Linneana*, Bill., in its want of tabulæ and in the fact that the calices are not surrounded by a thin polygonal rim. Though the external preservation of the specimens is not good, this much can be made out with certainty—the calices being always bounded by thick walls (Pl. I. fig. 1), and being in the best-preserved examples surrounded by thickened and raised circular borders, whereas in *S. Linneana* the calices have sharp-edged polygonal borders surrounding the cup-shaped apertures of the tubes. Moreover the present species appears to want the

marked septal ridges which surround the throat of the visceral chambers in *S. Linneana*; and its large corallites are decidedly larger than is the case in the latter form.

Horizon and Locality. Inferior Devonian, La Baconnière, Laval, Mayenne (coll. *Æhlert*).

A very nearly allied if not identical form occurs in the Eifel; but I have not yet fully examined this.

Pachypora Æhlerti, Nich.
(Pl. I. figs. 2-2 c.)

Spec. char. Corallum forming flat or slightly undulated expansions, the under surface of which was doubtless originally covered by an epitheca, though this is no longer recognizable, and which vary in thickness from 2 millims. up to a centimetre. The upper surface exhibits the apertures of the calices (Pl. I. fig. 2 a)—which are very irregular in shape, but usually exhibit two strong septal teeth, one on each side. Sometimes there is only a single well-marked projection of this nature; sometimes there are three such; but in any case the actual mouths of the corallites are never regularly polygonal or circular, or even crescentic, but are always to some extent encroached upon by well-marked inward prolongations of the wall, and their most general form is perhaps rudely quadrangular. Very commonly two or more of the calices run into one another, and the calicine apertures thus become vermicular. The actual diameter of the tubes of the corallites varies from one third to two thirds of a millimetre measured along their greatest lengths; but to that must be added the thickness of the walls, so that in general about four calices are found in a space of from 2 to 3 millims. The walls of the tubes, as seen in tangential sections (Pl. I. fig. 2 b), are very much thickened; but no lines of demarcation between adjoining corallites can be made out. In thin vertical sections (Pl. I. fig. 2 c) the same thickened condition of the walls and the absence of any proper boundary between adjoining tubes can be observed. Tabulæ complete, but few in number and irregularly developed. Mural pores not observed with certainty.

Obs. This well-marked form seems to be a *Pachypora* of the general type of *P. Fischeri*, Bill., and *P. frondosa*, Nich., though it possesses marked peculiarities of its own. Its characters, in fact, increase the probability that it may be ultimately necessary to still further subdivide the genus *Pachypora*, Lindst., retaining this name for forms like *P. lamellicornis*, Lindst., *P. Fischeri*, Bill., and their allies, and creating a new genus, or subgenus, for such more natural and normal types as *P. cervicornis*, Blainv., and *P. cristata*, E. & H.

Favosites punctatus, Boullier.

(Pl. I. figs. 3-3 c.)

Favosites punctata, Boullier, Annales Linnéennes, 1826.

Spec. char. Corallum massive, attaining a large size, and composed of regularly prismatic corallites, which radiate very gently outwards as the periphery of the colony is approached. Corallites basaltiform, angular, and thin-walled, the average tubes having a diameter of about one millimetre and a half, but having a considerable number of smaller corallites wedged in amongst them at their angles of junction. The walls of the corallites retain their primitively duplex character. Well-marked but irregularly-developed septal spines of a blunt form and upward direction can be detected in parts of the corallum. The tabulæ (Pl. I. fig. 3 c) are complete, numerous, horizontal, flexuous or slightly curved, separated by interspaces of from one third to one half of a millimetre. The mural pores are numerous, closely approximated, round or oval in shape, without a raised margin, four or five being generally present in the space of 2 millims. measured vertically; their arrangement is either uniserial, or they are disposed in two subalternating rows, according to the width of the prismatic faces of the corallites.

Obs. This species seems to have been overlooked by Milne-Edwards and Haime in their great work on fossil corals ('Polypiers fossiles,' 1851); and I am not aware that it has been in any way noticed by subsequent zoophytologists. It was, however, described and figured in a perfectly recognizable manner in the year 1826 by M. E. Boullier ("Mémoire sur une espèce de Polypier fossile rapportée au genre Favosite de Lamarck," extrait des Annales Linnéennes pour 1826). I am greatly indebted to Mons. Ehlert for having furnished me with an accurate transcript of the text and figures of this rare paper; and I can unhesitatingly support the validity of M. Boullier's determination.

The two species of *Favosites* to which the present form is most closely related are *F. basalticus*, Goldf., and *F. turbinatus*, Bill. The large corallites in *F. basalticus* are much larger than in *F. punctatus*; its tabulæ are in general wider apart; its mural pores are almost always uniserial (*Edwards and Haime*, Pol. foss. p. 236); and the breadth of the corallum is proportionally greater than the height. On the other hand, in *F. punctatus*, Boullier, the corallum is higher than broad, the diameter of the largest corallites is rarely above a millimetre and a half, the tabulæ are closely set, and the mural pores are at least as commonly biserial as uniserial. From *F. tur-*

binatus, Billings, the present form is distinguished by its not assuming the remarkable shape of the former and by the want of its peculiar epitheca, as well as by the commonly biserial condition of the pores and the more closely set tabulæ.

Horizon and Locality. Abundant and well preserved in the inferior Devonian deposits of La Baconnière, Mayenne.

Favosites? inosculans, Nich.
(Pl. I. figs. 4, 4a).

Spec. char. Corallum forming a large mass of unknown dimensions, the single specimen examined being 12 centims. in length by 7 in width, and 4 in height. The corallites are very minute, averaging half a millimetre in diameter, and radiating gently from the base. Very commonly, in fact in a large proportion of the corallites, the walls are partially deficient; so that two, three, or four adjoining tubes may run into one another laterally in a vermiculate manner (Pl. I. fig. 4), the boundaries between the different elements of such a common tube being indicated by short marginal and opposed ridges. The line of demarcation between the sclerenchyma of any one tube and that of its neighbours is in general recognizable by the presence of a clear linear space representing the primitive wall. The tabulæ are numerous, complete, and approximately horizontal. Septal spines not observed. The mural pores are numerous, very large, closely approximated, oval or rounded in shape, and arranged in a single series on each face of a tube, six or eight pores, or more, being present in a vertical space of 2 millimetres.

Obs. In general shape and aspect this singular species is very like a massive *Alveolites* or *Chætetes*. Its corallites, however, show nothing of the compressed and often crescentic or lunate character of those of *Alveolites*, and it clearly cannot be referred to this genus. On the other hand, it presents a curious resemblance to *Chætetes* in the imperfect condition of the walls of the corallites, and the resulting presence of blunt processes or ridges extending into the visceral chambers (Pl. I. fig. 4). In *Chætetes*, however, this appearance is due to the partial division of the old tubes, preparatory to their complete fission, whereas in the present case the adult tubes simply communicate with one another by a deficiency of their parietes. That the present species is not a true *Chætetes* is also conclusively shown by the fact that the duplex character of the walls of the tubes can be clearly recognized, as well as by the presence of numerous large mural pores. This last character proves it to belong to the Favositidæ, though its reference to *Favosites* proper is rendered

somewhat doubtful by the unusual thickening of the walls, as well as by the free intercommunication between adjoining corallites.

The single specimen of *F. ? inosculans* that I have examined does not exhibit any part of either the upper or lower surface in its original condition; and the preservation of the corallum in a remarkably soft and splintery rock (dolomite?) renders its microscopic examination peculiarly difficult. At the same time its minute structure is quite characteristic, and sufficiently separates it from any allied type with which I am acquainted.

Horizon and Locality. Inferior Devonian, Chalannes.

SPECIES OF CORALS ASSOCIATED WITH THE PRECEDING.

It may be of advantage if I append the following brief notes upon some of the remaining corals which were contained in the collection submitted to me by Mons. Ehlert, and which are associated with the new forms previously described.

1. *Favosites*, sp. A form like *F. gothlandicus*, Lam., in general shape, having a massive corallum composed of regularly prismatic corallites of tolerably uniform diameter, their ordinary width being about 2 millims., or rather less. As seen in tangential sections the walls are moderately thin, and no septa can be detected; but in long sections the walls are sharply undulated, or show well-marked spiniform and inwardly directed processes. The mural pores are of considerable size, sometimes uniserial, sometimes in two alternating rows on each prismatic face of a corallite. Tabulæ well developed, mostly half a millimetre or less apart.—*Horizon and Locality.* Inferior Devonian, St. Malo.

2. *Favosites gothlandicus*, Lam. Two specimens, which differ little from the ordinary Devonian examples of this species.

3. *Favosites Forbesi*, E. & H., var. (?). Corallum small, rounded, subhemispherical or spheroidal, mostly about an inch in diameter. Corallites of very unequal sizes, the larger ones averaging about 2 millims. in diameter, their walls being thick and their shape cylindrical. The smaller corallites are numerous, from rather more than a millimetre to half a millimetre in diameter, very variably shaped, but almost always angular. The tabulæ are strong, remote, and approximately horizontal. No traces of septa or septal spines detected. External surface of the tubes marked with numerous fine, slightly-curved striae. Mural pores of large size, sometimes uniserial, sometimes in two subalternate rows on each prismatic face.

This may be provisionally regarded as a variety of *F.*

Forbesi, E. & H., from which it differs in the comparatively large number and small size of the smaller corallites. It is most like *F. Forbesi*, var. *tuberosa*, Röm.; but the corallum never attains any great dimensions, and there are no traces of the characteristic epithecal or opercular investment of the latter. From *F. Forbesi*, var. *eifelensis*, Nich., it differs in the great number of the small tubes and the apparent absence of septal spines; and from *F. Forbesi*, var. *waldronensis*, Nich., it is separated by the smaller size of the large corallites as well as by their proportionately smaller number.—*Horizon and Locality*. Inferior Devonian, Saint Jean sur Mayenne and La Baconnière.

4. *Pachypora cervicornis*, De Blainv. Numerous specimens of this form, the branches varying in diameter from 5 millims. to over 2 centims., are represented in M. Ehlert's collection. Their internal and external characters are precisely similar to those of specimens from the Eifel.—*Horizon and Locality*. Inferior Devonian, Saint Jean sur Mayenne; Mont Jean, Gallois.

5. *Pachypora*, sp. A single fragment of limestone containing numerous stems of a small *Pachypora* imbedded in it. In structure and general character this form is like *P. cervicornis*, Blainv.; but the stems are all small (5 millims. or less in diameter), and the tubes are more minute and more delicate than in the latter. It is more nearly related to *P. meridionalis*, Nich. & Eth. jun., from the Devonian rocks of Queensland; but more extended material would very probably show it to be a distinct species.—*Horizon and Locality*. Inferior Devonian, La Baconnière.

6. *Heliolites porosus*, Goldf.—*Horizon and Locality*. Inferior Devonian, Chalonnès, La Baconnière, and Gallois.

7. *Heliolites*, sp. A form resembling *H. interstinctus*, Wahl., but with larger tubes and with some less conspicuous peculiarities.—*Horizon and Locality*. Inferior Devonian, Mont Jean, Gallois.

8. *Monticulipora Wintéri*, Nich. Several specimens (from the Inferior Devonian of La Baconnière), which, both in external characters and in microscopic structure, precisely agree with the examples of the Eifel. Dr. Steinmann, for whose opinion I entertain the highest respect, has suggested recently (N. Jahrb. für Min. Geol. und Pal. 1880, p. 438) that this species is really the *Favosites fibroglobosus* of Quenstedt, described from the same locality (Gees, near Gerolstein). I do not feel at present able to accept this conclusion, for two reasons. In the first place, I have made a careful examination of numerous specimens, both German and French, of the form which

I call *Monticulipora Winteri*, both externally and by means of microscopic sections, and I have totally failed to detect any traces of mural pores. In the second place, my own limited collections are sufficient to show me the impossibility of pronouncing positively upon the structure and affinities of any individual specimens, even of a known and marked external figure, and from a known locality, unless a microscopic examination has been instituted; and the form now under discussion is an excellent example of what I now say. I find, namely, that I possess in the collection which I personally made at Gees three quite distinct forms, all of which so closely resemble each other externally that, until I had made thin sections of them, I had placed them together in the same tray, as indubitably belonging to the same species. One of these three forms is the type which I have described under the name of *Monticulipora Winteri*; another is a true *Fistulipora*, as defined by M^cCoy; and the third is a genuine *Alveolites*, and is provided with numerous and well-marked mural pores. The form described by Quenstedt under the name of *Favosites fibroglobosus* (Petrefact. Deutschlands, Bd. vi. S. 15, Taf. 143) is one with which I am unfortunately unacquainted; but it might, so far as external form is concerned, easily be any one of the three forms which I have just enumerated; or it might be a fourth, quite distinct form. In any case, the facts I have mentioned are quite sufficient to prove that the occurrence of a fossil at a particular locality and its possession of a well-marked external form cannot be allowed to count for any thing (so far as the more delicately constructed species of corals are concerned) when we come to determine generic or specific relations and affinities.

9. Associated with the preceding were species of *Aulopora*, *Cyathophyllum*, *Zaphrentis*, and *Cystiphyllum*, which my leisure would not permit me to specifically determine. M. Ehlert's collection also contained some interesting Stromatoporoids, which I may take the opportunity of describing on some future occasion.

EXPLANATION OF PLATE I.

- Fig. 1.* A fragment of *Striatopora pachystoma*, Nich., of the natural size.
Fig. 1 a. Portion of a tangential section of the same, enlarged seven times.
Fig. 1 b. Part of a vertical section of the same, enlarged seven times, showing the thickened walls and a few mural pores.
Fig. 2. A fragment of *Pachypora Ehlerti*, Nich., of the natural size.
Fig. 2 a. A small portion of the surface of the same, enlarged eighteen times, showing the form of the calices.
Fig. 2 b. Portion of a tangential section of the same, enlarged eighteen

times, showing the thickened walls and the septal (?) teeth of the corallites.

Fig. 2 c. Vertical section of the same, enlarged eighteen times, showing the thickened walls and the remote tabulæ.

Fig. 3. A small fragment of *Favosites punctatus*, Boullier.

Fig. 3 a. Three tubes of the same, enlarged three times.

Fig. 3 b. Tangential section of the same, enlarged seven times.

Fig. 3 c. Vertical section of the same, enlarged seven times, showing the mural pores and tabulæ.

Fig. 4. Tangential section of *Favosites* (?) *inosculans*, Nich., showing the free communication between many of the corallites, enlarged eighteen times.

Fig. 4 a. Vertical section of the same, enlarged eighteen times, showing the large mural pores and the tabulæ.

III.—*Description of a new Species of Mus from Southern India.* By OLDFIELD THOMAS, F.Z.S., British Museum.

THE specimen here described was obtained at Kadapa, Madras, by Colonel R. H. Beddome, and has been presented to the British Museum, together with a large series of other Indian Muridæ, by Mr. W. T. Blanford, after whom I propose to name it

Mus Blanfordi, sp. n.

Fur above slate-colour, tipped with fawn; hairs rather long and soft. Belly white, sharply defined. Tail longer than head and body; basal half dark, distal half above and below white; distal third covered with soft, white, shining hairs about a quarter of an inch long, forming a pencil at the tip. Tarsus rather long. Five front and six hind foot-pads. Ears long, oval, nearly naked. Mammæ six, one pectoral and two inguinal pairs.

The skull differs from those of all other Indian rats by the front edge of the external wall of the infraorbital foramen being strongly slanting instead of perpendicular. The interparietal also is much more elongated transversely than usual.

Measurements of the type, an adult female:—Head and body (about) 4·1 inches; tail 6·1; hind foot, without claws, 1·2; forearm and hand 1·3; ear-conch, length from external base ·70, breadth ·54; skull 1·42.